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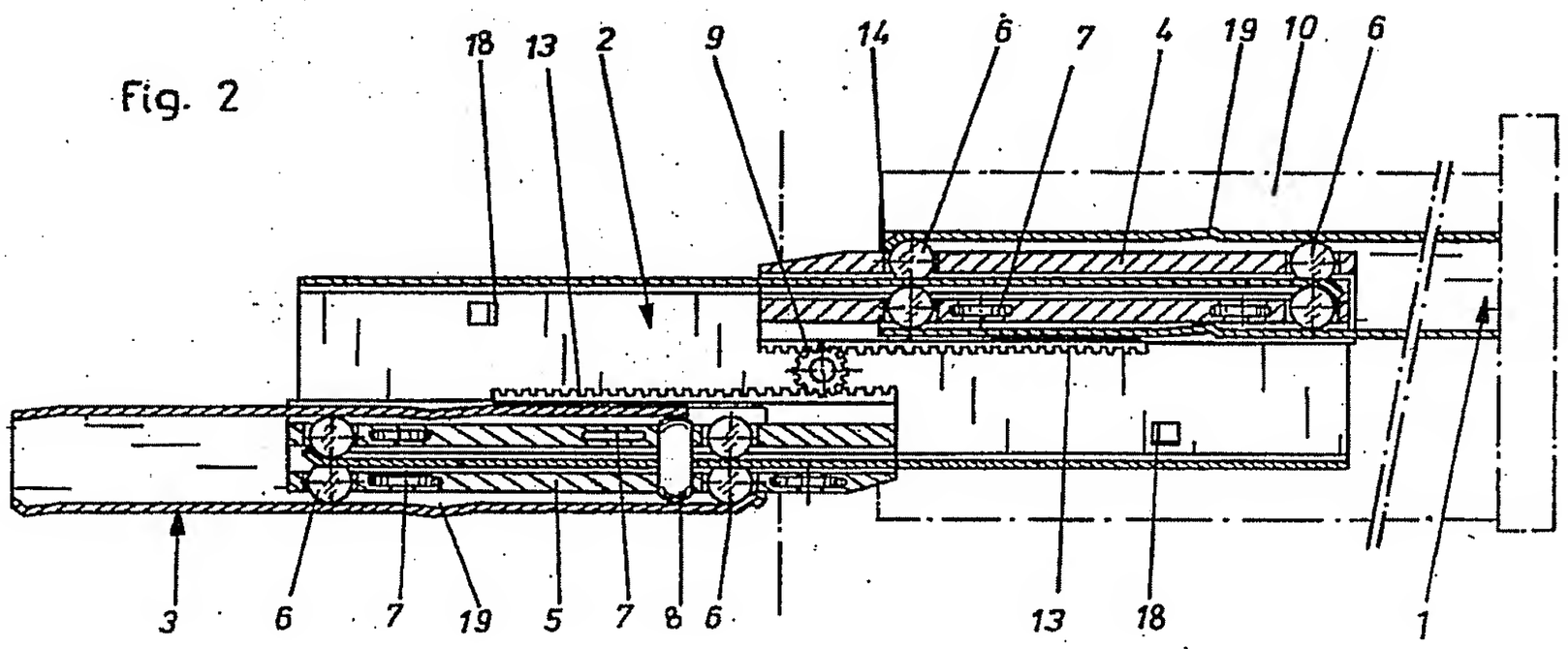
(71) Applicants
Julius Blum Gesellschaft m.b.H.,
Im Stadtle 498, A-6973 Höchst, Austria
(72) Inventors
Erich Röck
Bernhard Mages
(74) Agents
Marks & Clerk,
57-60 Lincoln's Inn Fields,
London, WC2A 3LS

# (54) A telescopic drawer slide assembly

(57) A telescopic drawer slide assembly comprising: supporting rails 3 on the cabinet, pull-out rails 1 fastened to the drawer, and intermediate rails 2 arranged between said rails, the load being transmitted between said rails by rollers 6 contained by carriages 4, 5; wherein the movement between the carriages, or between a carriage and one of the rails, is governed by an equalizing mechanism which also holds the members of the pull-out guide together, when the drawer has been entirely taken out of the body of the piece. As shown each carriage is provided with a rack 13 which meshes with a pinion 9 located therebetween, and the pinion is journalled to the intermediate rail 2.

Fig. 2

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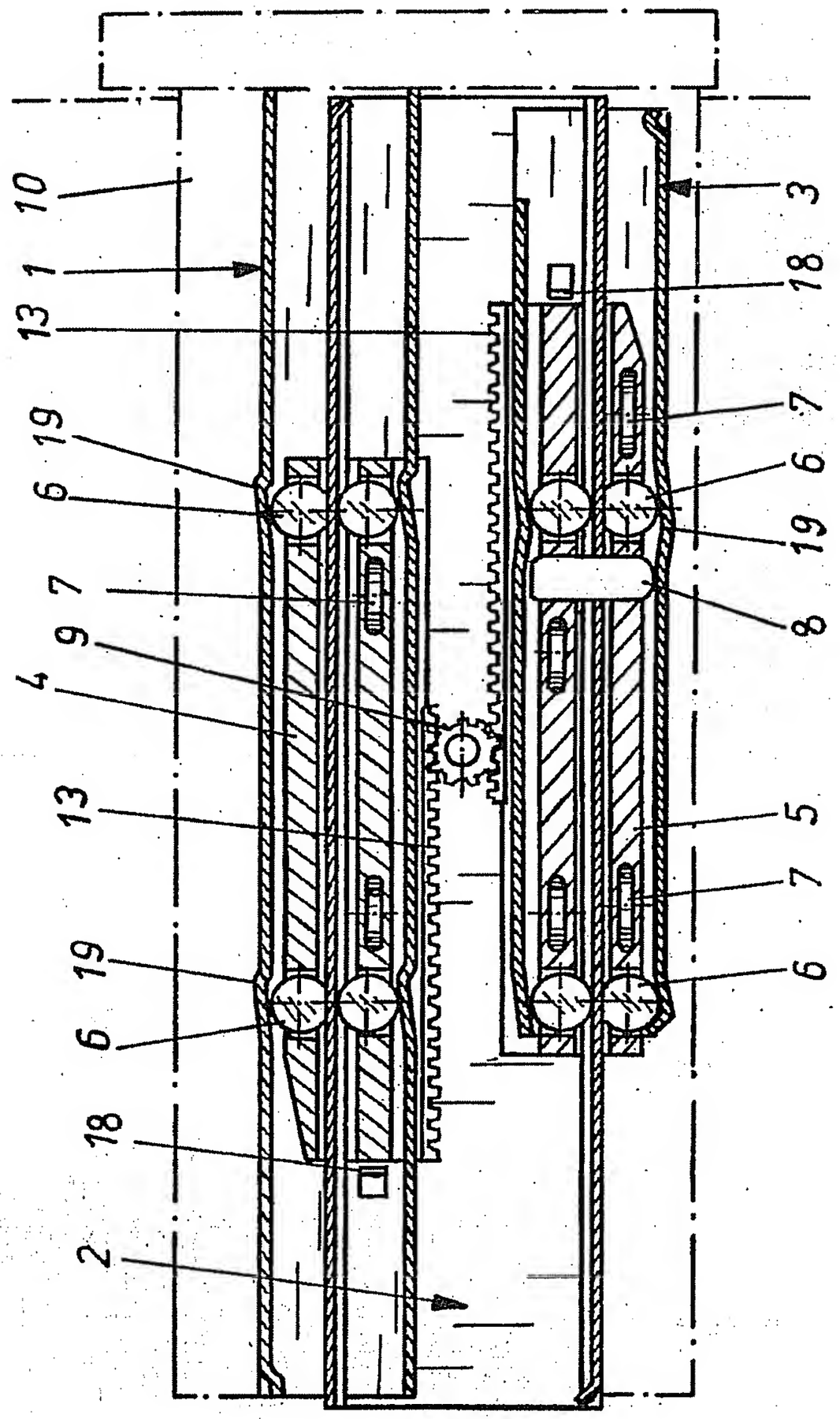



Fig. 1

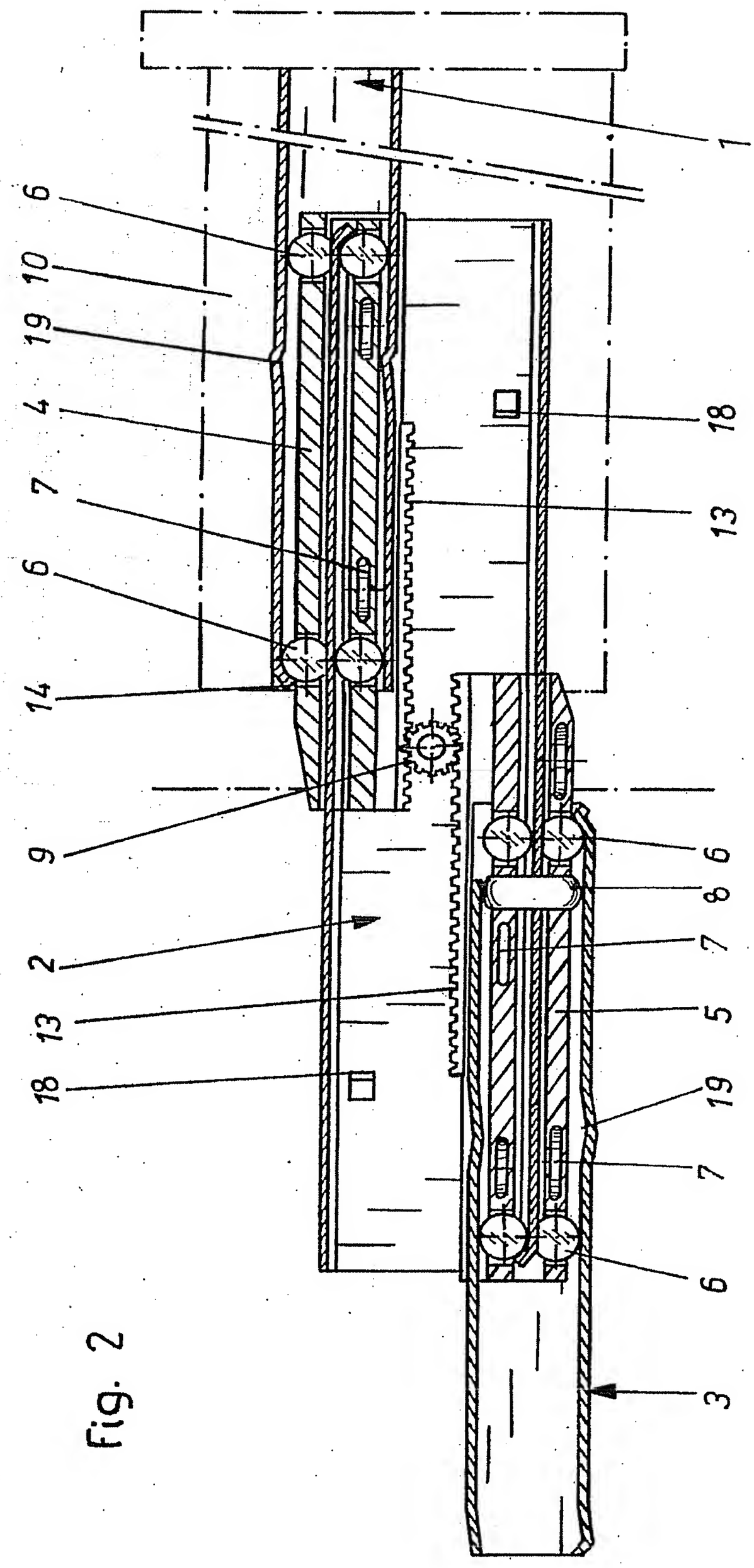



Fig. 2

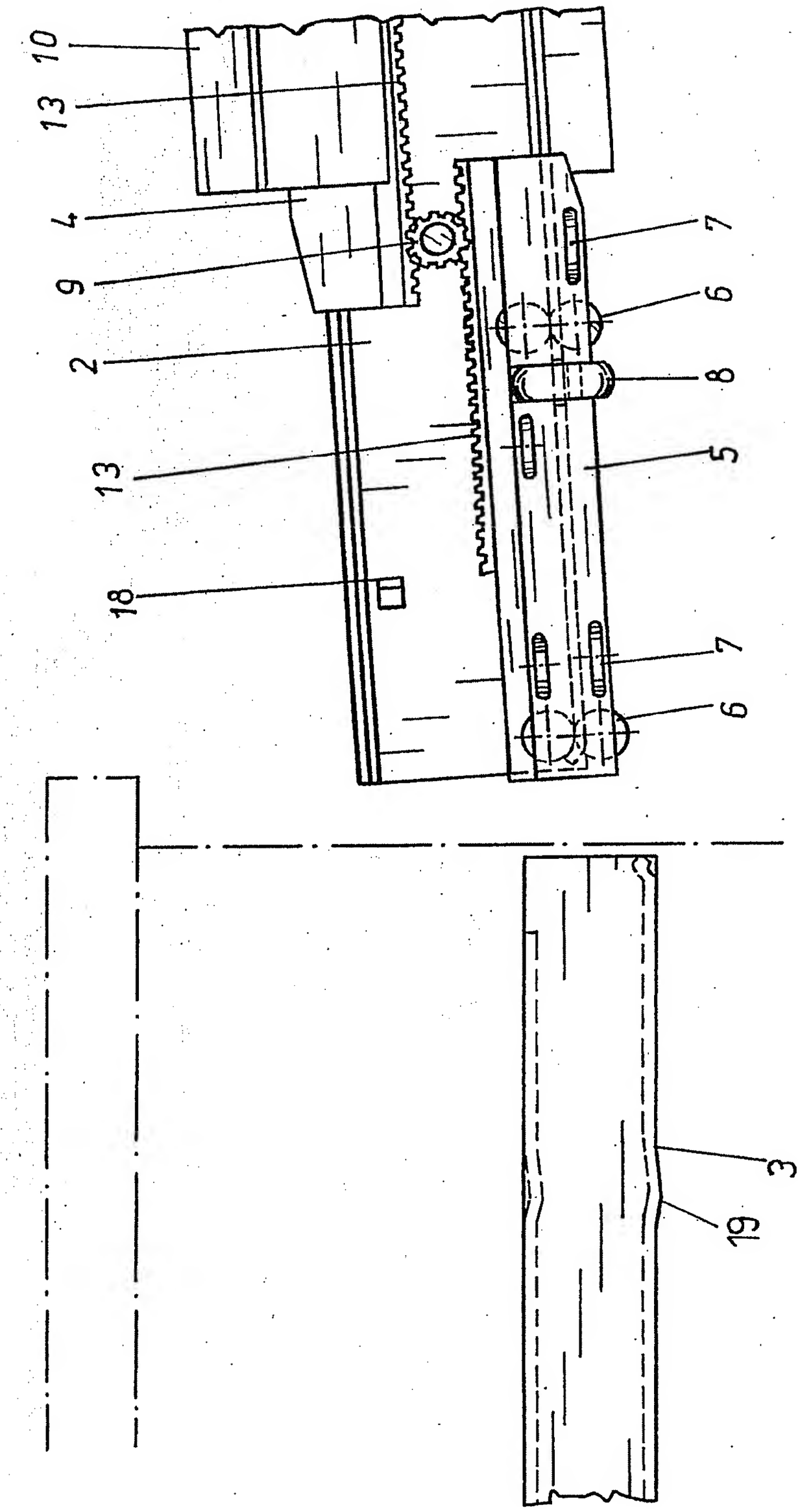



Fig. 3

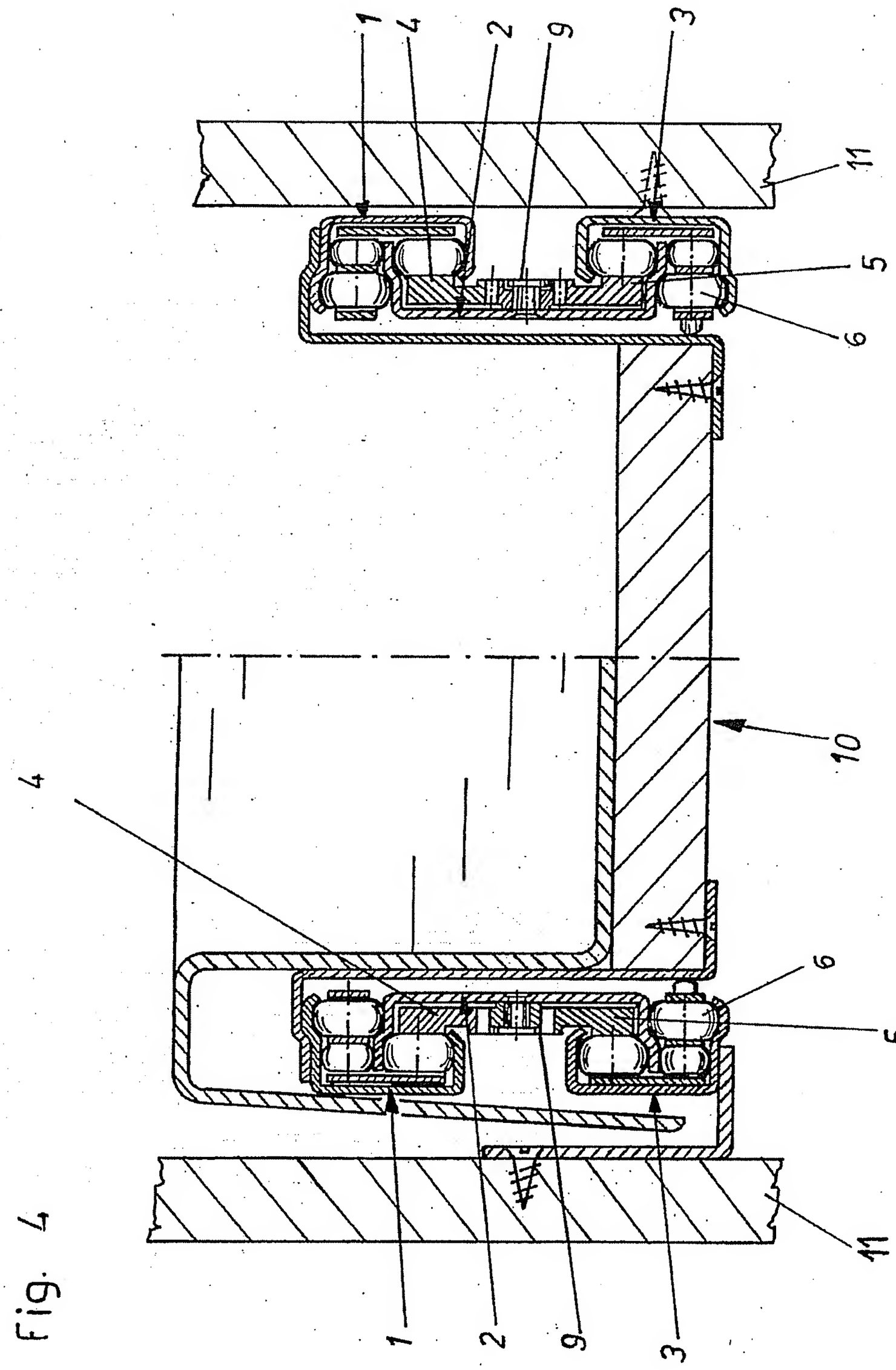



Fig. 4

Fig. 5

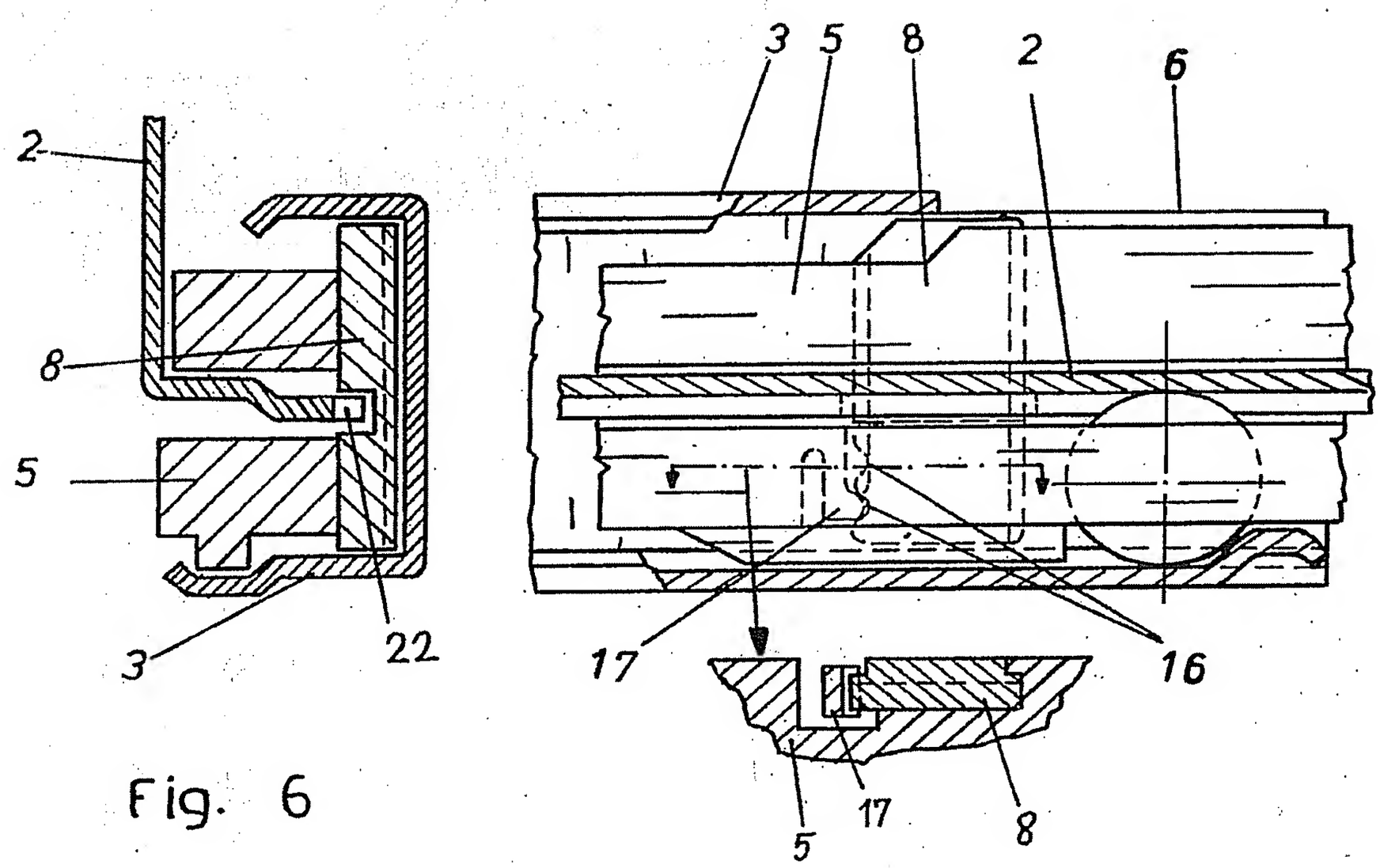



Fig. 6

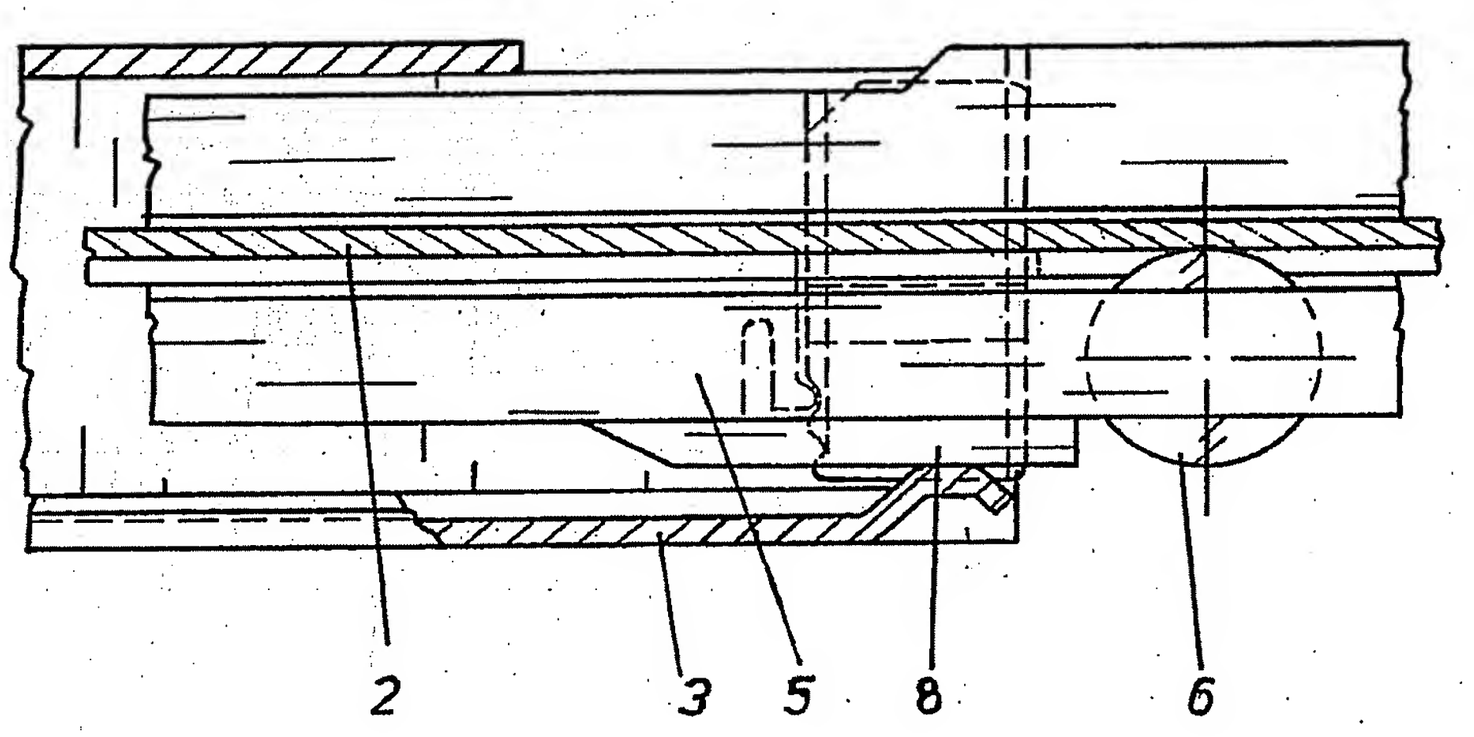


Fig. 7

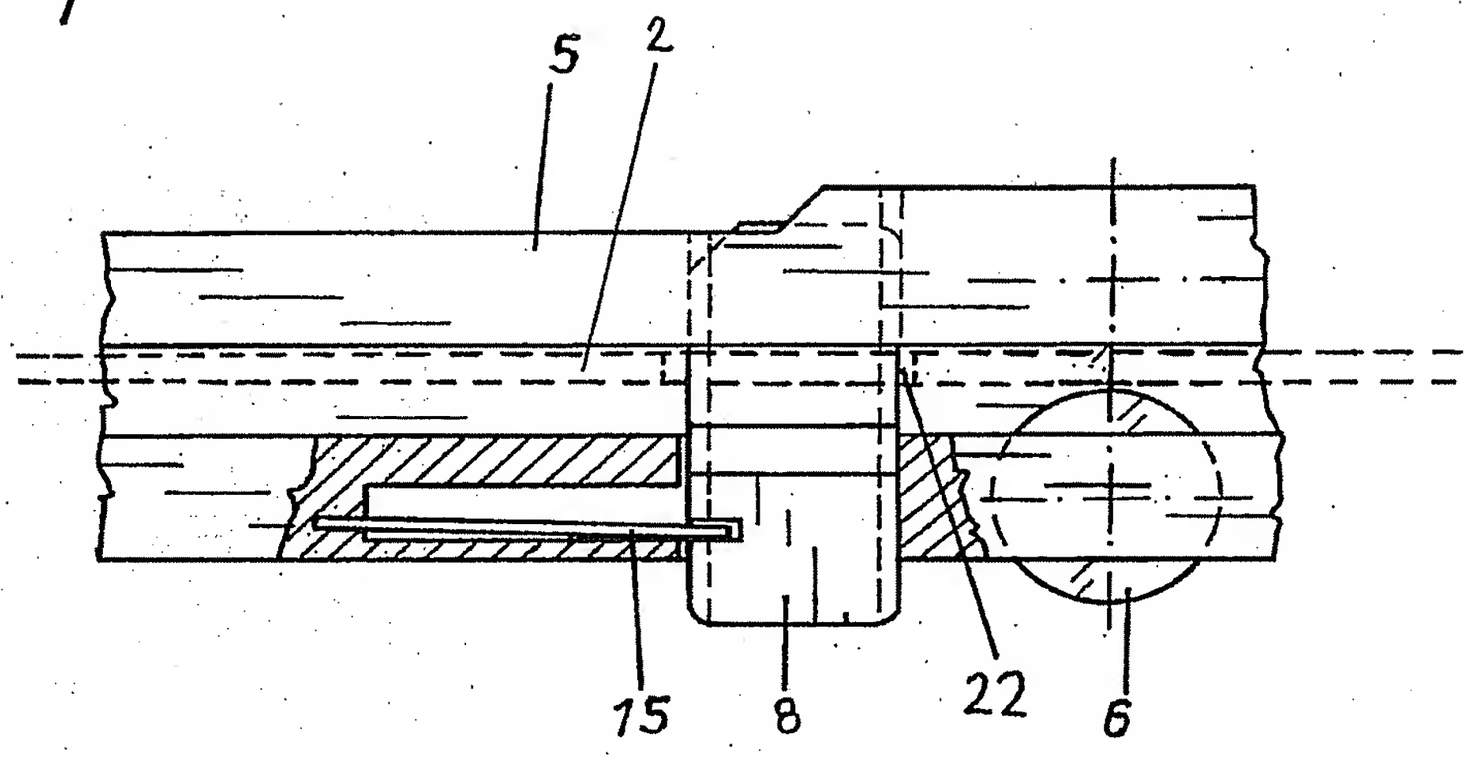



Fig. 8

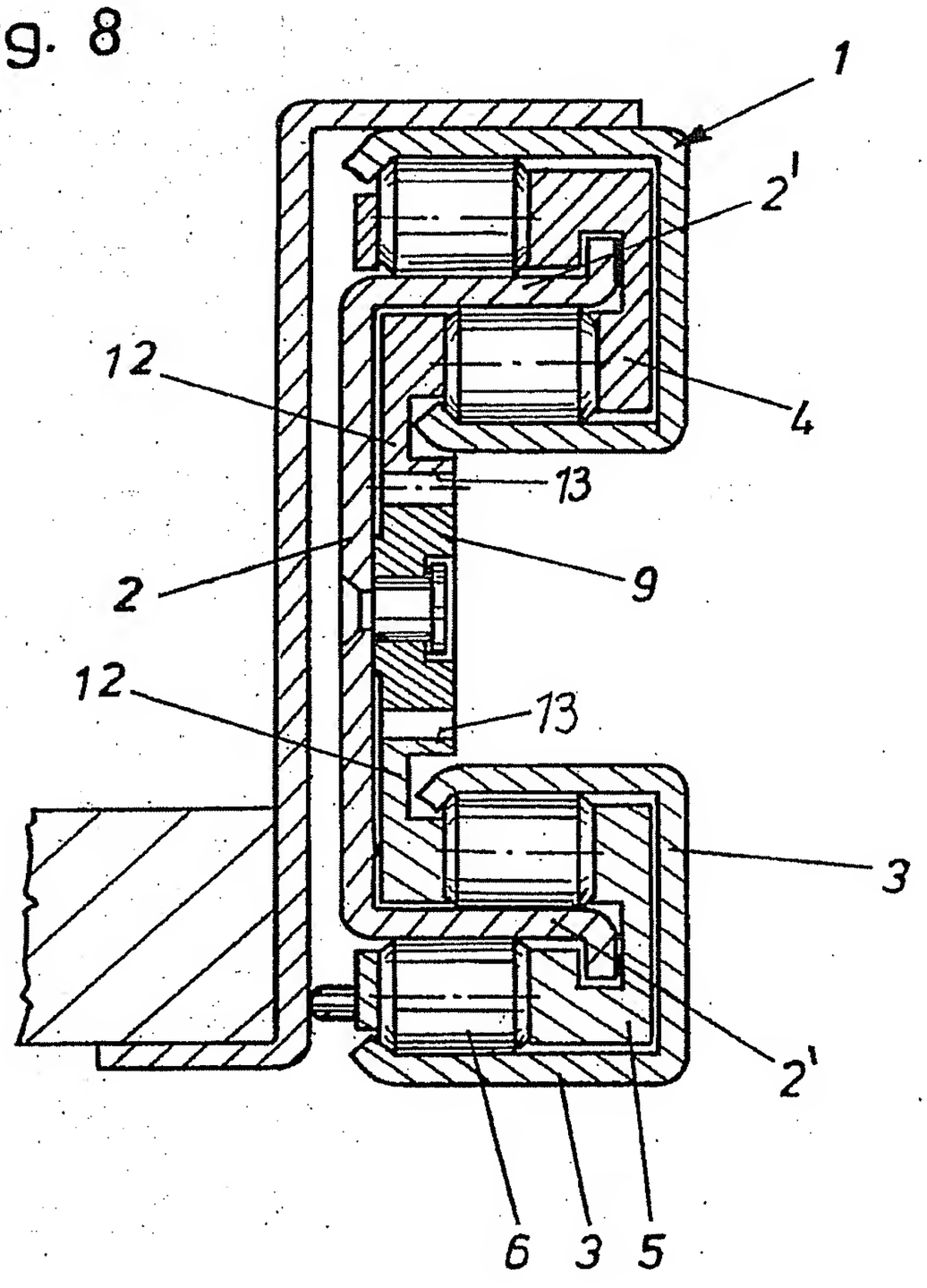


Fig. 9

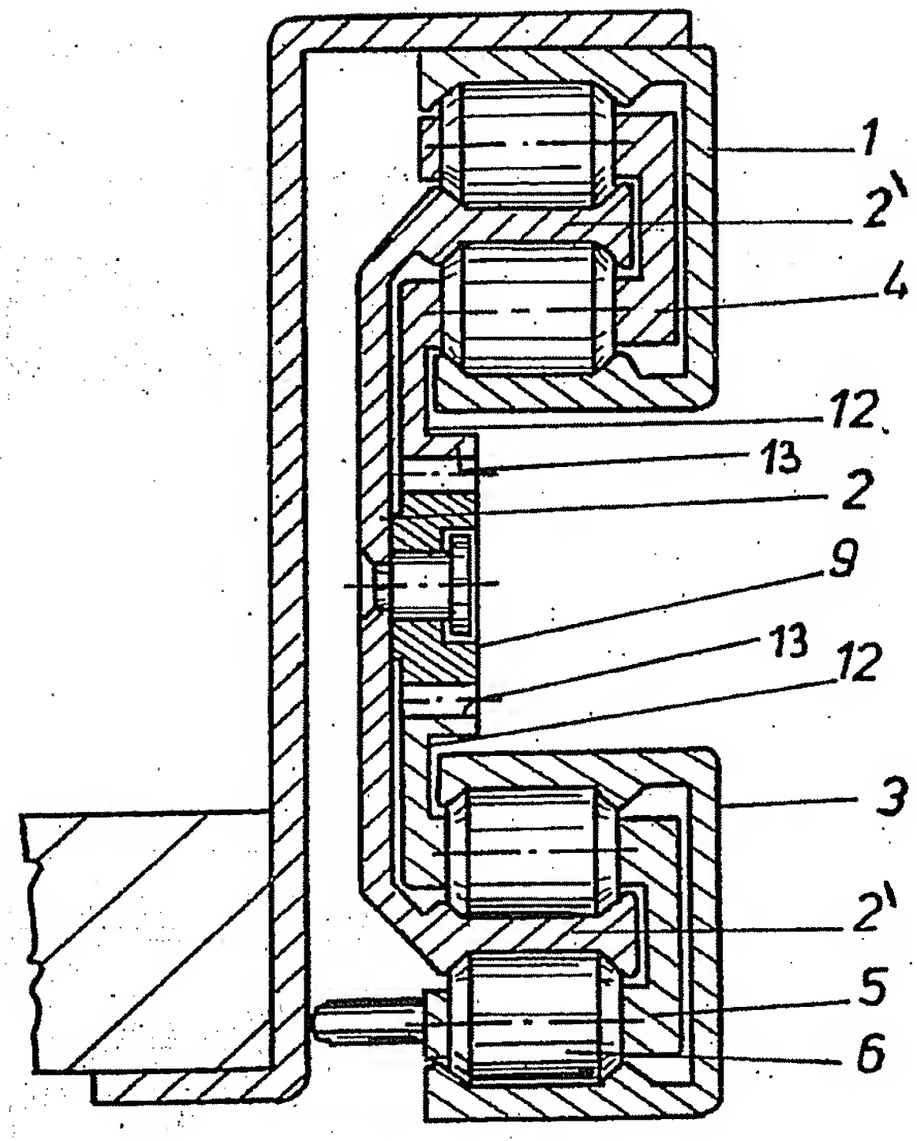
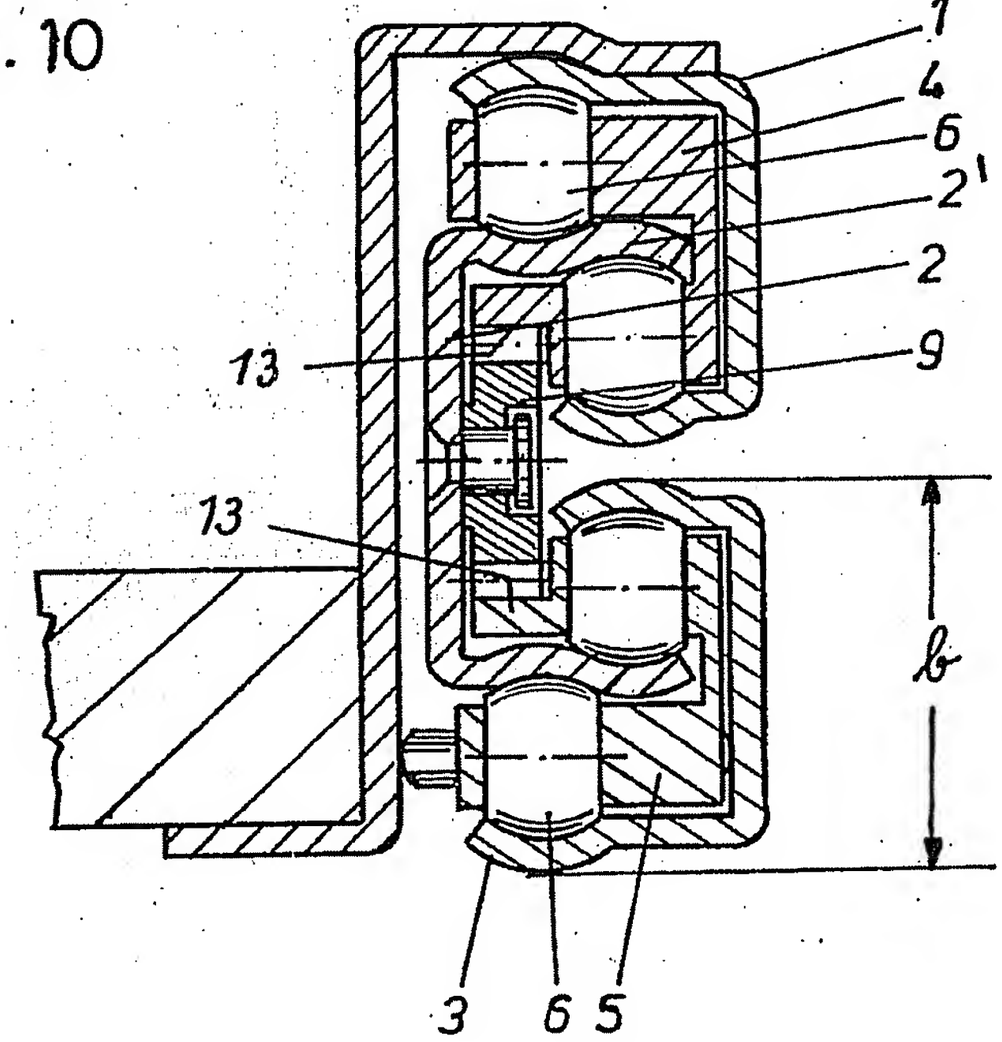



Fig. 10



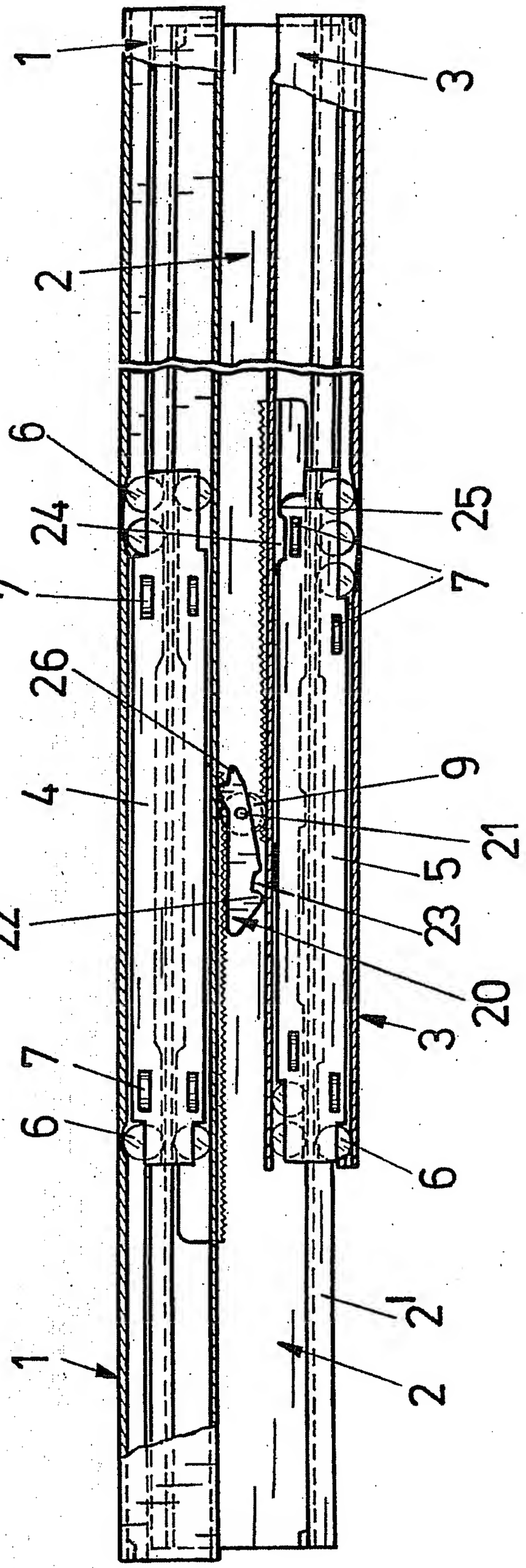



Fig. 11

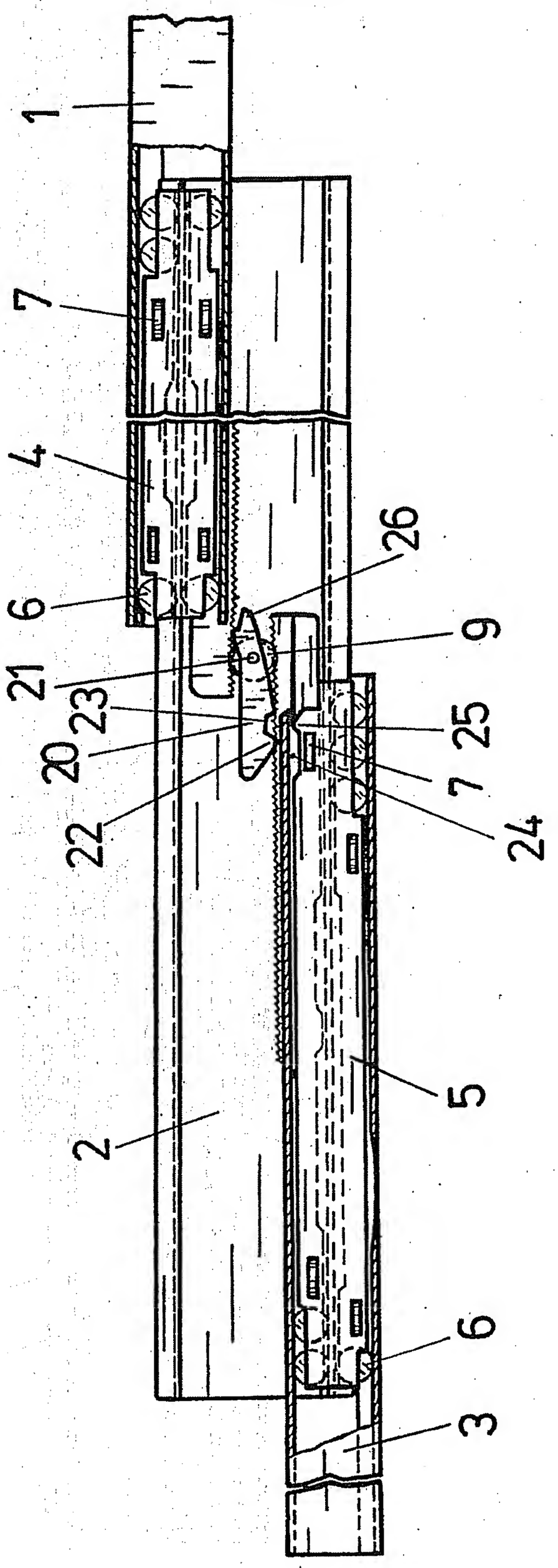



Fig.12

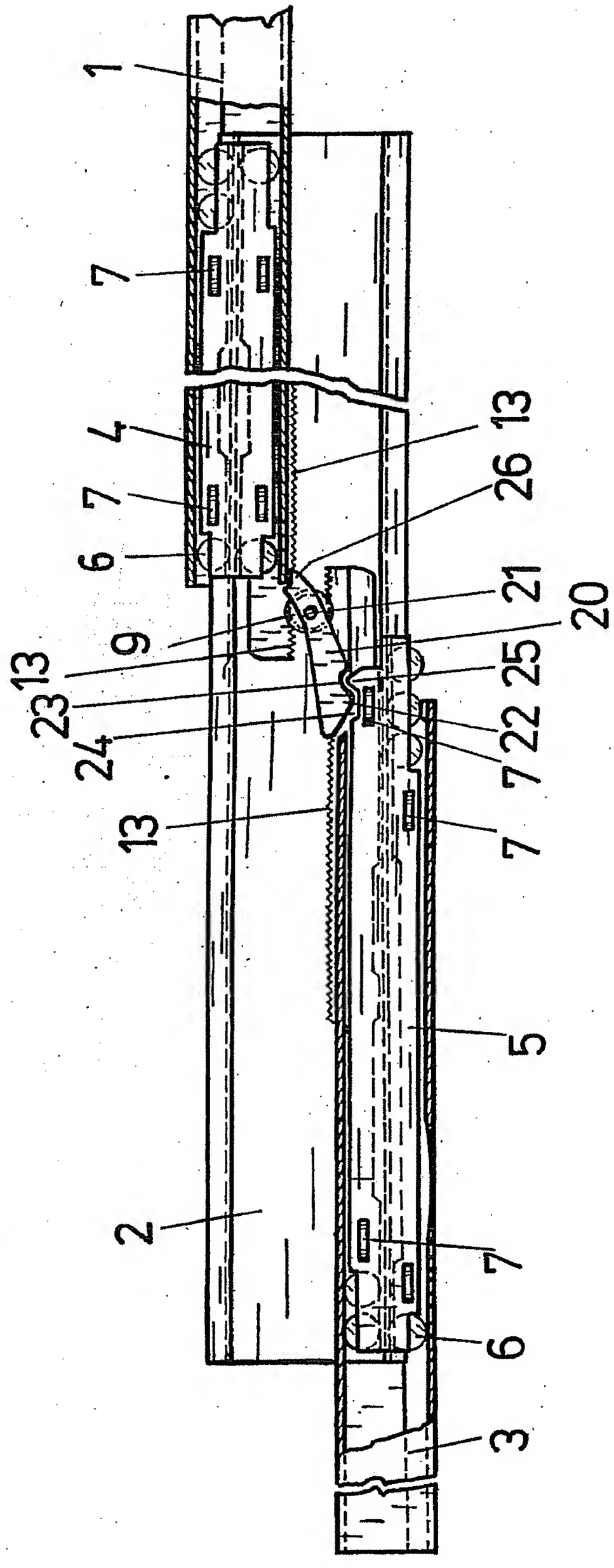



Fig.13

Fig.14

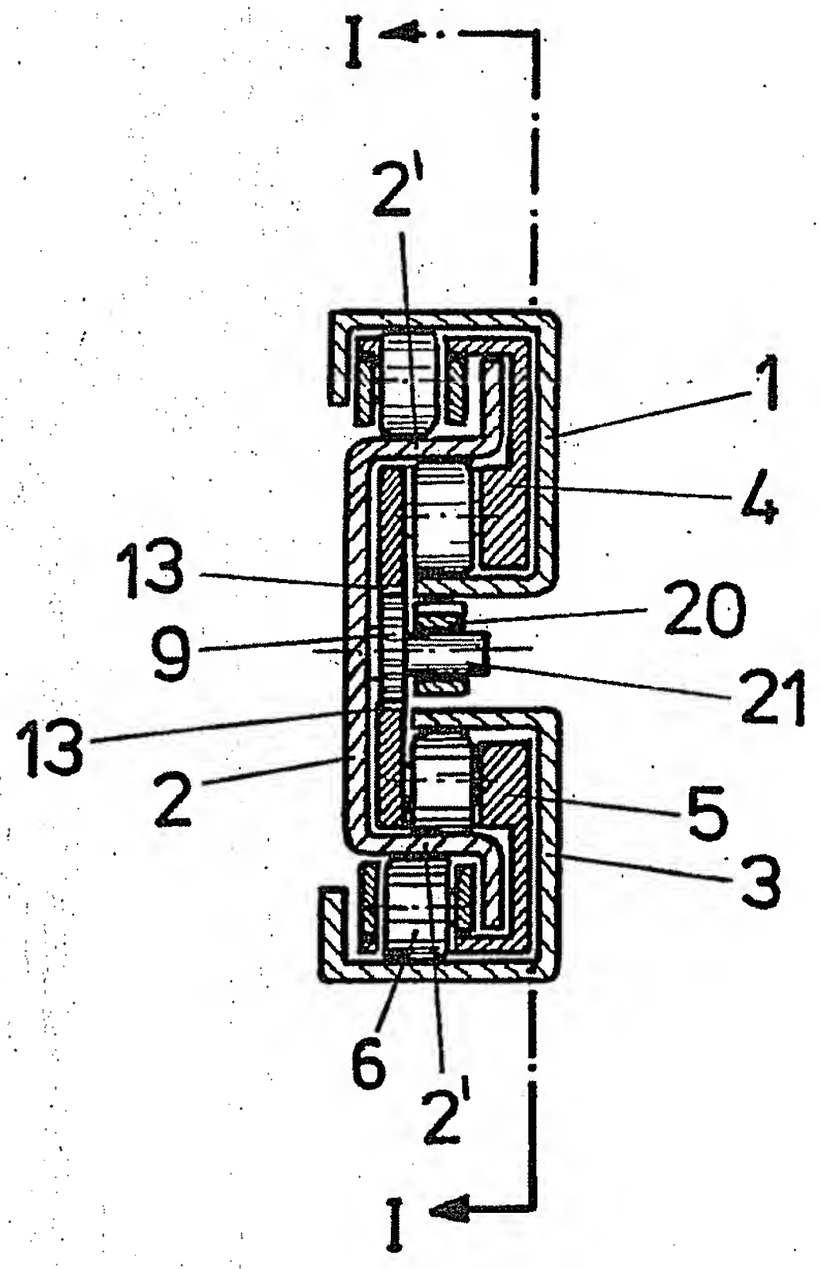
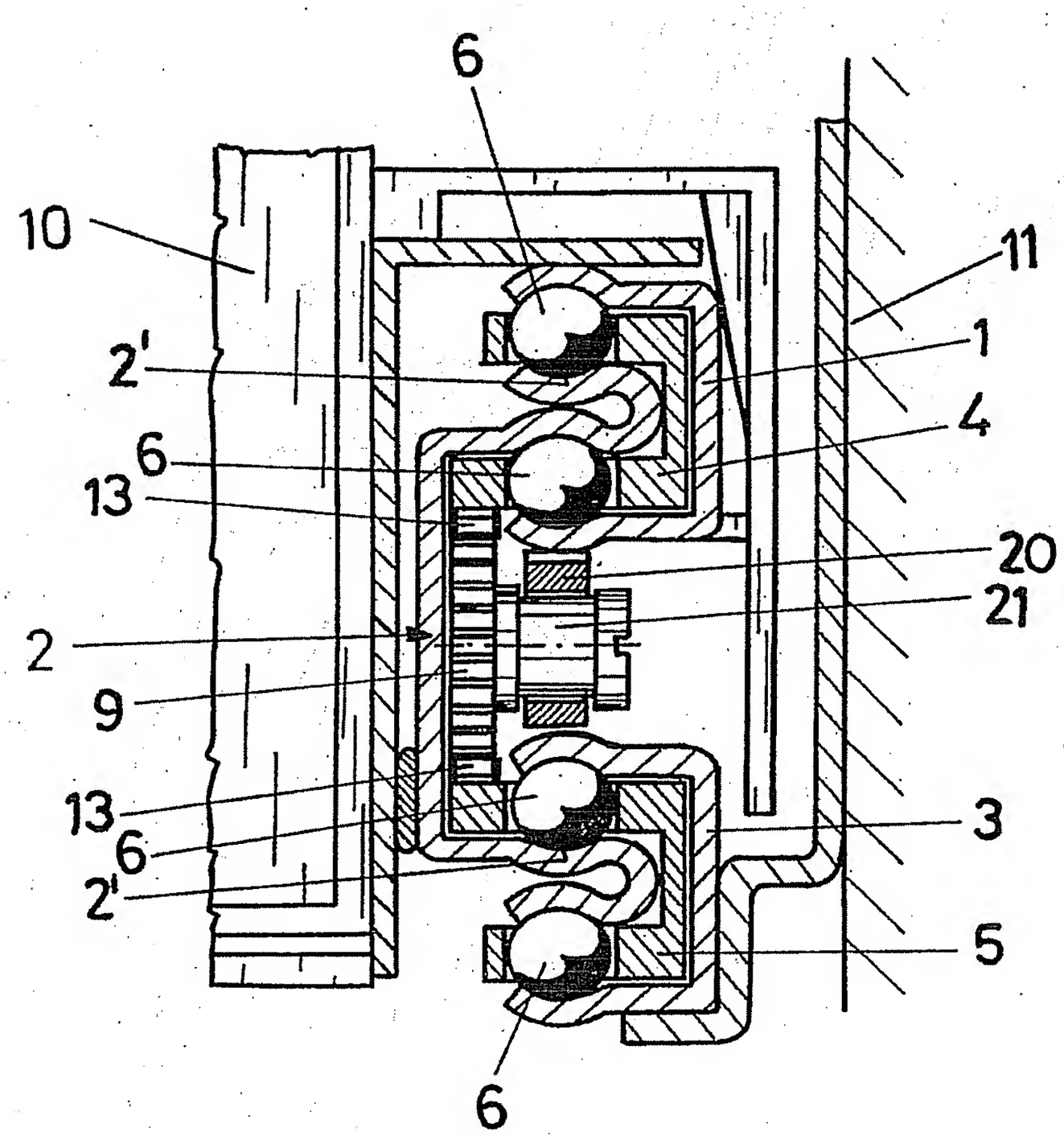


Fig. 15



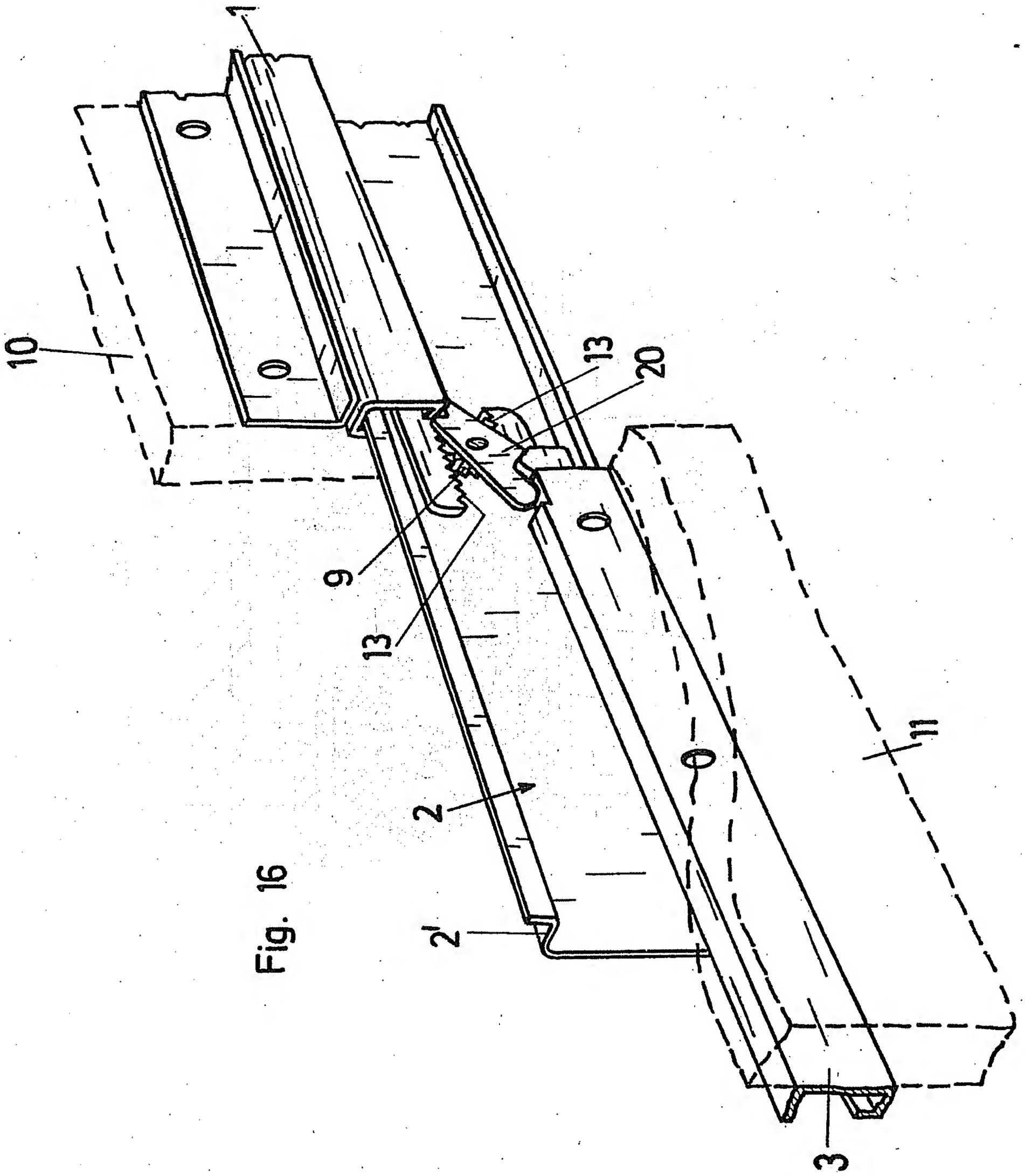



Fig. 16

SPECIFICATION

**A pull-out guide assembly for drawers**

The present invention relates to a pull-out guide assembly for drawers or the like comprising a supporting rail on either side of the body of the piece of furniture, a pull-out rail on either side of the drawer and a center rail running differentially between said two rails, the load of the drawer being transferred by means of rollers or the like.

Pull-out guides of the above-mentioned kind are frequently used in modern furniture construction. With their help the drawers can be pulled out more easily and without obstruction even if the drawer carries heavy loads. With so-called differential pull-out guides, which comprise three rails on each side, i.e. a pull-out rail on the side of the drawer, a supporting rail on the side of the body and a center rail differentially running inbetween, it is possible to pull the drawer fully out of the body of the piece of furniture in order to have free access to the interior of the drawer, the drawer being still retained in the body of the piece of furniture.

An increasing number of so-called carriages have lately been used in pull-out guide assemblies.

These carriages have the advantage that they can be manufactured at low costs (they can entirely be made of injection-moulded plastics material) and guarantee a smooth running of the pull-out assembly.

Such guides have the disadvantage that the carriages are not precisely aligned in respect of one another, i.e. there is no uniform course of movement between the rail and the carriage, when the drawer is pulled out or pushed in. The carriage may have already reached its final stop and thus be retained before the outward resp. inward movement of the assembly is finished. Hence, the rollers or balls can no longer move freely between the open rails.

It is, therefore, the object of the present invention to provide a pull-out guide of the afore-mentioned kind in which the movements of the two carriages are controlled in respect of each other as well as in respect of the center rail so that an optimum uniform movement is obtained, when the drawer is pulled out and pushed in. The carriages shall be prevented from sliding on the individual rails, they should at least not slide over a remarkable distance.

The carriages and/or the rails should particularly be retained in their exact positions, when the drawer, which has been taken out, is inserted again so that the carriages are in the position required for the subsequent course of movement of the rails.

According to the present invention this is achieved by mounting the rollers on each side of the drawer in two carriages, one of said carriages being mounted in the supporting rail and the second of said carriages being mounted in the pull-out rail and by providing safeguard control means between the two carriages and/or one carriage and the supporting-or pull-out rail.

It is preferably provided that a pinion is mounted in the center of the center rail, said pinion mating both carriages with rack profiles, thus forming safeguard control means.

The DE-OS 23 15 316 (Merz) and the DE-OS 20 18 671 (Stanley) show the employment of pinions and toothed racks as control means in pull-out guides. These pull-out guides do, however, not belong to the kind described in the present invention as they comprise no carriages. Consequently, the problem of determining the position of the carriages does not arise.

It is a further object of the present invention to provide a pull-out assembly whose individual members do not fall apart, when the drawer has been pulled out fully of the body of the cupboard. The individual members are fixed to one another in such a manner that the drawer can again be pushed into the body without any further measures, whereby said members, i.e. the supporting rail, the pull-out rail, the center rail and the carriages are in the position which guarantees an immediate functioning of the pull-out guide assembly.

According to the present invention this is achieved by providing one of the carriages with locking means retaining it undisplaceably on the center rail, when the drawer is in the pulled-out position.

It is preferably provided that the locking means are arranged on the carriage mounted in the supporting rail on the side of the body.

Particularly safe locking means are obtained by providing them in the form of a slide which is preferably acted upon by a spring and engages a hole in the center rail, when the drawer is in the pulled-out position.

A further embodiment of the invention provides that the horizontal flanges of the supporting rail and of the pull-out rail are provided with a recess arranged approximately in the centers of said flanges.

By means of this embodiment the drawer, which is pushed into the body of the piece, engages the recesses, one roller, each, of a carriage is pressed into the recess by the load of the drawer.

A minimum resistance has to be overcome, when the drawer is being pulled out. Said resistance prevents the drawer, however, from rolling forwards unintentionally.

A further embodiment of the present invention provides that the center rail is positively mounted in the carriages.

A further embodiment of the present invention provides, that the carriages have a marginal flange projecting the profile of the pull-out rail resp. of the supporting rail in the vertical direction, the rack profile being formed on said marginal flange.

A further embodiment of the invention provides that a stop is arranged at the rear end of the pull-out rail securing the carriage mounted in said pull-out rail from falling out.

When the drawer is fully pulled out of the cupboard, the carriage mounted in the pull-out hangs in the rail and carries the center rail, the carriage running in the rail of the furniture side wall being retained on the center rail and pulled out with said body rail.

A further embodiment of the present invention provides that the safeguard control means are

formed by a catch rotatably mounted on the center rail, said catch being a two-arm lever which spaces both carriages or one carriage and the supporting- or pull-out rail from one other, when the rails are fully pulled-out.

It is preferably provided that the catch engages a recess in a carriage.

A further embodiment provides that the slide rail props against the catch.

It is preferably provided that the recess is arranged in the carriage on the side of the supporting rail.

In order to control the movement of the carriages to an optimum extent the whole operation of the pull-out guide assembly, a preferred embodiment provides that a pinion is arranged on the rotation axis of the catch, said pinion mating the two carraiges with the rack profiles.

In the following embodiments of the present invention will be described in greater detail by means of the figures of the drawing without being limited thereto.

Figure 1 shows a sectional side view of a drawer with a pull-out assembly in accordance with the present invention, the drawer being pushed into the body of the piece of furniture.

Figure 2 shows the same view as fig. 1, the drawer being pulled out of the body but still anchored thereto,

Figure 3 shows a partial side view of the pull-out guide assembly, the drawer being fully pulled out of the body of the piece,

Figure 4 shows a sectional view of a drawer with a pull-out guide assembly parallel to the front panel, the embodiment comprising a covering plastics side wall being illustrated on the left side,

Figure 5 shows three views of a section of a carriage comprising a slide, which is disengaged,

Figure 6 shows the same section, the slide engaging the center rail,

Figure 7 shows a section of a carriage with a further variant of the slide,

Figures 8 through 10 show sectional views parallel to the front panel of the drawer of various embodiments of the pull-out guide assembly in accordance with the present invention,

Figures 11 through 13 show schematic side views of a further embodiment of a pull-out guide assembly in accordance with the present invention, the drawer being in the pushed-in position and in the extreme pulled-out position,

Figures 14 and 15 show cross-sectional views of a pull-out guide assembly in accordance with the present invention, fig. 14 showing a carriage with rollers and fig. 15 showing a carriage with balls, fig. 16 shows schematically a perspective view of a pull-out guide.

The figures of the drawing show only those members of the pull-out guide assembly which are laterally arranged on one side of the drawer or, maybe, on a shelf. It is obvious that the second part of the pull-out guide assembly, which is mounted on the other side of the drawer, is analogous to the first one.

The drawer and the side wall of the body of the piece have not been illustrated in the figures of the drawing, or they have only been indicated, as these members and the means for fastening the assembly in accordance with the present invention to the piece of furniture are not part of the present invention and known to a person of ordinary skill in the art.

As can particularly be seen in figures 1 and 2 and 11 through 15, the pull-out guide assembly in accordance with the present invention comprises a pull-out rail 1 fastened to the side wall of the drawer 10, a supporting rail 3 fastened to the side wall 11 of the body of the piece of furniture, two carriages 4, 5, the carriage 4 being mounted in the pull-out rail 1 and the carriage 5 in the supporting rail 3, and a center rail 2 differentially running between the pull-out rail 1 and the supporting rail 3, the two horizontal flanges 2' of said center rail being pushed into the carriages 4 resp. 5 and mounted between the rollers 6 of the carriages 4, 5.

The center rail 2 is thus mounted between the pull-out rail 1 and the supporting rail 3.

The carriages 4, 5 are in some cases provided with horizontal compensating rollers 7 moving laterally on the vertical flanges of the rails, on the carriage 4 of the pull-out rail 1 and of the center rail 2, on the carriage 5 of the supporting rail 3 and of the center rail 2, thus guaranteeing an absolutely smooth running of the pull-out guide assembly.

The carriages 4, 5 are provided (with the exception of the embodiment in accordance with fig. 10) with marginal flanges 12 projecting over the profiles of the pull-out rail 1 resp. the supporting rail 3, said marginal flanges being provided with a rack profile 13.

A pinion 9 rotatably mounted in the center of the center rail 2 mates with the rack profile 13. The carriages 4, 5 and the center rail 2 are, thus, safeguard-controlled in respect of one another.

This means that independently of the friction of the rollers 6 on the individual rails produced by the load of the drawer 10, the carriage 5 also moves automatically, when the other carriage 4 moves as well.

In the embodiment in accordance with fig. 10, the rack profile 13 is arranged within the breadth b of the profile of the supporting rail 3 resp. the pull-out rail 1.

In the embodiment in accordance with figures 1 through 10, the carriage 5 mounted in the supporting rail 3 is provided with a slide 8 being acted upon by a leaf spring 15.

When the drawer 10, as illustrated in fig. 3, is fully pulled out of the body of the piece and when the carriage 5 is in front of the supporting rail 3, the spring 15 presses the slide 8 through a hole resp. recess 22 into the lower horizontal flange 2' of the rail 2. The flange 2' and the recess 22 have been indicated in fig. 7 for the sake of better understanding.

Thus, the carriage 5 is retained on the center rail 2, which is retained in the carriage 4. Said carriage 4 is mounted in the pull-out rail 1, thereby being retained by a stop 14 (fig. 2).

Consequently, the drawer 10 can be fully pulled out of the body of the piece of furniture without making the individual members of the pull-out guide

assembly fall apart.

In the embodiment in accordance with figures 5 and 6, the slide 8 is not acted upon by a spring but provided with two lateral crimps 16, a cam 17 injection moulded to the carriage 5 alternately engaging said crimps. The slide 8 is by means of said cam 17 retained either in the operating position or in the locking position. The slide 8 is moved by the horizontal flanges of the supporting rail 3 resp. by the position of the carriage 5.

When the drawer 10 is pushed into the body of the piece and, hence, the carriage 5 into the supporting rail 3, the slide 8 is unlocked by the lower horizontal flange of the supporting rail 3, and the pull-out guide assembly is fully serviceable.

Stops 18 are arranged on the center rail 2, said stops being adapted to correct the position of the carriage.

The recess 19 in the slide rails of the pull-out rail 1 and the supporting rail 3 guarantee a secure support of the drawer 10 in the body of the piece due to the fact that the rollers 6 engage in said recesses, when the drawer 10 is closed.

When the drawer 10 is pulled out, a slight resistance has to be overcome, and the drawer 10 has to be pulled out of the recess 19 in order to allow a free forward movement. It is, thus, avoided that the drawer 10 rolls out of the body of the piece unintentionally.

In the embodiment in accordance with figures 11 through 15, the catch 20 is rotatably mounted on an axle 21 in the center of the center rail 2.

The catch 20 has a projection 22 and a recess 23 which correspond to a recess 24 and a projection 25 on the carriage 4 running in the supporting rail 1, when the drawer is fully pulled out.

On the other end, the catch 20, which is a two-arm lever, is provided with a recess 26.

Said recess receives the rear end, i.e. the end of the pull-out rail 1 directed away from the drawer front panel, when the pull-out rail 1 is in the extreme pull-out position.

In this position, the lever arm of the catch 20, which belongs to the carriage 5, is tilted downwards, and the other lever arm, i.e. the one belonging to the pull-out rail 1, is tilted upwards.

By means of this embodiment, the carriages 4, 5 and the pull-out rail 1 are spaced in respect of one another.

Instead of spacing the pull-out rail 1, the catch 20 could also space the carriage 4 from the carriage 5.

The embodiment in accordance with the present invention guarantees that the pull-out rail 1 and the carriage 4 are prevented from sliding inwards too early, when the drawer 10, which has entirely been taken out of the supporting rail 3, is inserted again.

First the catch 20 has to be unlocked from the carriage 5, and only then the pull-out rail 1 and the carriage 4 are released.

In the embodiment, the pinion 9 is also mounted on the axle 21. Said pinion 9 mates the carriage 4 and the carriage 5 with rack profiles 13, whereby the movements of said carriages 4, 5 are controlled in respect of one another, as already provided in the afore-described embodiment.

CLAIMS

1. A pull-out guide assembly for drawers of the like comprising a supporting rail on either side of the body, a pull-out rail on the side of the drawer and a center rail running differentially between said two rails, the load of the drawer being transferred by means of rollers or the like, wherein said rollers are mounted on each side of the drawer in two carriages, one of said carriages being mounted in said supporting rail and the second of said carriages being mounted in said pull-out rail, and wherein safeguard control means are provided between said two carriages and/or one of said carriages and said supporting rail or said pull-out rail.

2. A pull-out guide assembly in accordance with claim 1, wherein a pinion is mounted in the center of said center rail, said pinion mating both of said carriages with rack profiles, thus forming said safeguard control means.

3. A pull-out guide assembly in accordance with claim 1 and/or 2, wherein one of said carriages is provided with locking means retaining it undisplaceably on said center rail, when the drawer is in the pulled-out position.

4. A pull-out guide assembly in accordance with claim 3, wherein said locking means are arranged on said carriage mounted in said supporting rail on the side of the body of the piece of furniture.

5. A pull-out guide assembly in accordance with claim 3 and/or 4, wherein said locking means are formed by a slide preferably being acted upon by a spring and engaging a hole in said center rail.

6. A pull-out guide assembly in accordance with claim 1 and/or 2, wherein the horizontal flanges of said supporting rail and of said pull-out rail are provided with a recess arranged approximately in the centers of said flanges.

7. A pull-out guide assembly in accordance with claim 1 and/or 2, wherein said center rail is positively mounted in said carriages.

8. A pull-out guide assembly in accordance with at least one of claims 1 through 7, wherein said carriages have a marginal flange projecting the profile of said pull-out rail resp. of said supporting rail in the vertical direction, said rack profile being formed on said marginal flange.

9. A pull-out guide assembly in accordance with one of claims 1 through 8, wherein a stop is arranged at the rear end of said pull-out rail, said stop securing said carriage mounted in said pull-out rail from falling out.

10. A pull-out guide assembly in accordance with claim 1, wherein said safeguard control means are formed by a catch rotatably mounted on said center rail, said catch being a two-arm lever spacing both of said carriages or one of said carriages and said supporting rail or said pull-out rail from one another, when said rails are fully pulled out.

11. A pull-out guide assembly in accordance with claim 10, wherein said catch engages a recess in one of said carriages.

12. A pull-out guide assembly in accordance with claim 10, wherein said pull-out rail props against said catch.

13. A pull-out guide assembly in accordance with

claim 11, wherein said recess is arranged in said carriage on the side of said supporting rail.

14. A pull-out guide assembly in accordance with claim 2 and/or 10, wherein said pinion is arranged on the rotation axis of said catch, said pinion mating said carriages with said rack profiles.

15. A pull-out guide assembly substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

16. A piece of furniture including a drawer provided with a pull-out guide as claimed in any one of the preceding claims.

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